

## THE FIRST MESOZOIC RECORD OF THE ENIGMATIC FOSSIL *PALAEOXYRIS* FROM NORTH AMERICA; CHINLE FORMATION, PETRIFIED FOREST NATIONAL PARK

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THE PROBLEMATIC fossil genus *Palaeoxyris* is represented by about 15 described species of fusiform capsular structures. Specimens of several species are particularly abundant in Pennsylvanian siderite nodules such as those from Mazon Creek, Illinois and many localities in Great Britain. Mesozoic records are rare and extend into the Lower Jurassic or Lower Cretaceous depending on the affinities of ?*P. jugleri* (Crookall, 1930; Zidek, 1976). Until now, there have been no reports of *Palaeoxyris* from the Mesozoic of North America.

The affinities of *Palaeoxyris* are uncertain, and speculation on this issue has been ongoing for over 150 years. Based on their common association with fossil plants, and features such as a pedicle-like structure at one end and rhomboidal markings on the surface, they were thought to be some form of plant fruiting structure. However, other workers have noted that the so-called pedicel occurs distally in attached specimens, and the rhomboidal structures are actually artifacts caused by compression of the spiral segments. Furthermore, no specimens have been reported with preserved cuticle showing cellular structure, even when occurring with well-preserved plant compression fossils. Some workers believe that *Palaeoxyris*

is a fossil shark egg case somewhat similar to those of extant heterodontid sharks, as this is the only modern group with spiral egg cases. However, the extinct hybodont sharks have been implicated by some researchers as the most likely producers of *Palaeoxyris* (e.g., Zidek, 1976).

Three impression fossils attributable to *Palaeoxyris* were recently discovered in Petrified Forest National Park by S. R. Ash and provided to the author for study. The fossils were found in the wetland facies associated with the Newspaper Rock bed in the Blue Mesa Member of the Chinle Formation at locality PFP 004 (see Parker, this volume) together with many other fossils including crayfish, clam shrimps, insects, and impressions of leaves, stems, and cones of several types. Presumably, the putative egg capsules and other fossils were deposited on the floodplain when the adjacent stream that formed the Newspaper Sandstone Bed overflowed its banks.

Based on the three available specimens (Figs. 1 - 4), the body of the Chinle *Palaeoxyris* was about 12.5 mm long and 7.5 mm wide at the widest point, and tapered gradually toward each end. The "pedicel" is 4.3 mm wide at the point of

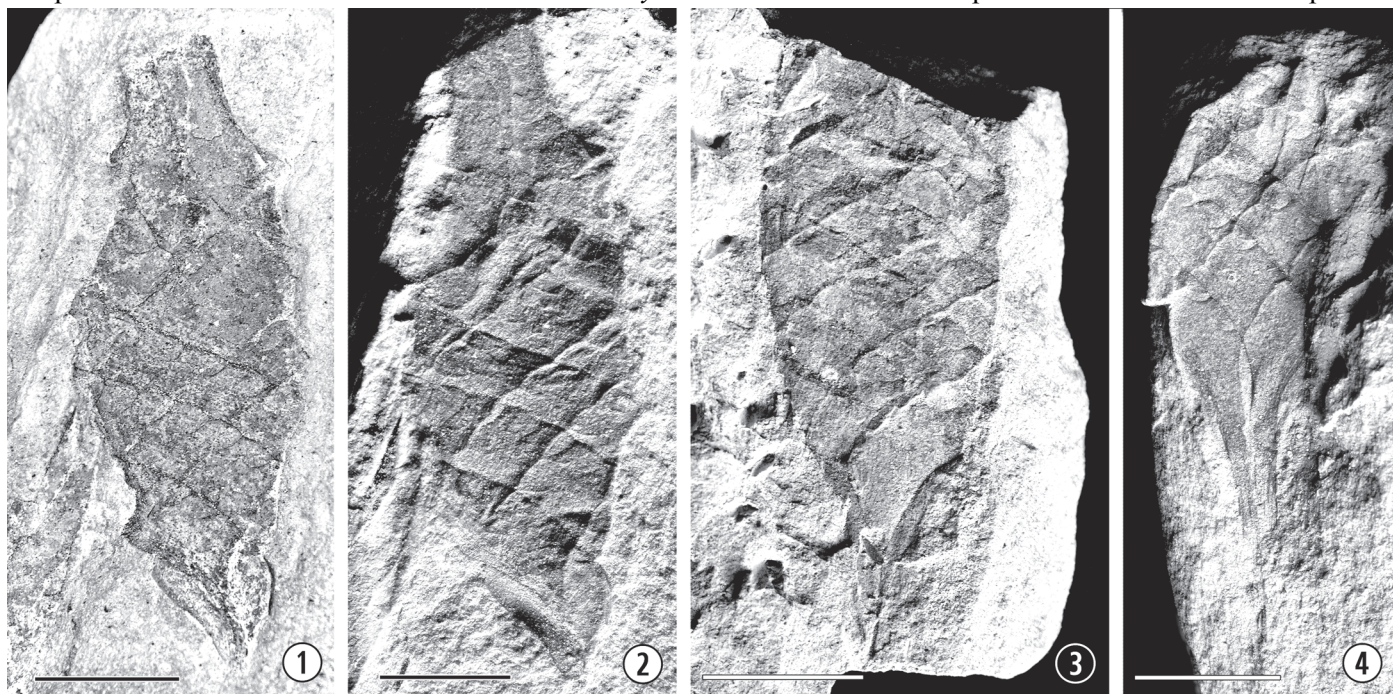


Figure 1. 1-4, *Palaeoxyris* sp. from the Blue Mesa Member of the Chinle Formation in Petrified Forest National Park. Scale bars = 0.5 mm. 1. Nearly complete specimen showing gross morphology. The "pedicel" is at the top of the image [i.e., pointing up.] PEFO 34350; 2. Specimen from Fig. 1 under extreme incident light to emphasize the spiral banding pattern. PEFO 3450; 3. Partial specimen showing banding on body. PEFO 3451; 4. Partial specimen with well-preserved beak pointing downward. PEFO 3452.

attachment to the body, and extends out at least 13.5 mm before ending at the edge of the matrix on one specimen (Figs. 1 – 2). A partial specimen with a well-preserved beak (Fig. 4) indicates that this structure terminated as a spine-like structure at least 3.0 mm in length. The body is traversed by about 5 spiral bands averaging 1.9 mm in width (Figs. 1 – 3). The bands arise at an angle of about 27 degrees in the middle of the body, but at a steeper angle (~ 56 degrees) near the ends. Compression of the bands on each side of the body produces the characteristic rhomboidal pattern (Figs. 1- 4).

Comparisons with previously described species of *Palaeoxyris* are ongoing. However, it appears that the Chinle form is most similar in size, shape, and banding characteristics

to the European Triassic/Lower Jurassic form *P. muensteri* (Crookall, 1930). The lack of any indication of preserved cuticle on the new specimens could be interpreted as further evidence that *Palaeoxyris* is not a plant, as cuticle is common on many Chinle plant fossils. However, the Chinle sample size is very small, and cuticle is sometimes absent from the plants as well. It is also intriguing that hybodont shark remains are known from the Chinle Formation in the park (Murry and Kirby, 2002) as well as elsewhere in Arizona (e.g., Kirby, 1989). Although the Chinle form sheds no new light on the affinities of *Palaeoxyris*, this occurrence is consistent with the hybodont egg case hypothesis. It is also significant in representing the only Mesozoic record of this taxon from North America.

#### REFERENCES

- Crookall, R. 1930. Further morphological studies in *Palaeoxyris*, etc. Geological Survey of Great Britain and Museum of Practical Geology, Summer Program for 1929, 3:8-36.
- Kirby, R. E. 1989. Late Triassic vertebrate localities of the Owl Rock Member (Chinle Formation) in the Ward Terrace area of Northern Arizona, p. 12-28. In S. G. Lucas and A. P. Hunt (eds.), Dawn of the Age of Dinosaurs in the American Southwest. New Mexico Museum of Natural History, Albuquerque, NM.
- Murry, P. A., and R. E. Kirby. 2002. A new hybodont shark from the Chinle and Bull Canyon Formations, Arizona, Utah, and New Mexico. New Mexico Museum of Natural History & Science Bulletin, 21:87-106.
- Zydek, J. 1976. A new shark egg capsule from the Pennsylvanian of Oklahoma, and remarks on the chondrichthyan egg capsules in general. Journal of Paleontology, 50:907-915.